

SUPPLEMENT.

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FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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IMPROVEMENTS IN LIGHT.

Atmospheric density, so unpleasantly apparent in those eccentric visitations known as London fogs, has long battled (more or less) successfully with our means and appliances of light. Experiencing very forcibly the want of a more effective illuminating power than is at present available, every gas consumer in this metropolis, and, it may be asserted, throughout the country at large, feels a personal interest in whatever system is put forward as an improvement in the application of this great and valuable agent to public, commercial, and domestic purposes.

To enquire into such attempts of chemical and mechanical skill is a duty, in fact, in a sanitary point of view, no less than in that of aiding and preserving our visual organisation, which, all must acknowledge who have to work hard by gaslight, has some rather severe tests to contend with.

Light shed first upon chaos, we are taught to believe, influenced at the breathed word of the CREATOR all that he had so sublimely called into being, and this accepted, the moral comparison may be pointed out between the mimic efforts of man to copy this great work of creation and the act of Omnipotence itself. Why, we have been for years labouring to supply adequate "artificial light" for our ordinary and extraordinary purposes; but, it must be confessed, have failed to suitably penetrate even the obscurity of a single city office. If a place is moderately lighted it is exhibited in a dingy gleam; if well lighted, according to the customary acceptance of the term, it is flushed forth in a heated glare, hurtful to the eye, and baneful to the general health. Now, what is really wanted by every business man is a light by which he can, in defiance of sullen fogs and short days, pursue his avocations without being driven prematurely blind, and without having inflicted on those he employs ills and inconveniences, of which all engaged in large establishments particularly, very loudly complain. The health of numbers in London mercantile firms is, much more than would be at first sight supposed, noxiously affected by the gas at present in use. In private houses complaints are constantly heard of the gaseous impurities and the oppressive heat so generated; but how much more must those suffer who have to toil, mentally and physically, for many hours out of the twenty-four in such an atmosphere? The sanitary question involved in this fact is of the utmost public importance, and it is, therefore, incumbent on everyone who has the interest of our working-classes at heart to meet it with grave and deliberate consideration.

The purification and improvement of gas have of late years been themes of numerous theorists—philosophical and chemical—their aim and intent being economy in consumption, purity in quality, and increase of light, leaving to mechanical inventors the necessary task of constructing an apparatus by which those desiderata could be best insured. However, efficiency in the mechanism constructed did not keep pace with the subtler scientific principles developed by the *savants*, and numerous were the failures in consequence; but at length, it would seem, a practical success has been achieved in improvement, not only of the chemical but of the mechanical means brought into action. Messrs. NORDHOFF and Co.'s apparatus, to which they have given the name of the Gas Carburettor, is largely testified to as securing all the advantages required. Its simplicity of construction is certainly, in the first instance, much in its favour, the more so that there is perfect safety in its application, while the economy of consumption it effects is estimated at a minimum of 30 to 35 per cent.; but, if only used to obtain a light equal to ordinary gas, the consumption is diminished by upwards of 50 per cent., 500 feet of carburetted gas giving the light of 1000 feet of ordinary gas, so says the report made by two professors of the Imperial College of the City of Nimes, where, at the *Exposition Regionale* of 1863, this invention was exhibited. Further, it has been proved that the gas issues from the carburettor perfectly pure; in fact, so essentially freed from all taint of sulphurous acid that the gilding, painting, and other ornamentation of the interior of habitations remain unharmed in the slightest degree, which is not the case in the presence of the gas now used, by which great injury is done to furniture and costly embellishments.

Another striking feature of this system is, that the increase of illuminating power to the common gas passed through the carburetted apparatus is from 150 to 300 per cent., one carburetted burner giving the light of two or three ordinary ones. The recommendation of the jury who awarded the gold medal of the Exhibition of Nimes to the patentees is worthy here of particular notice, as showing how practically they put to the proof the scientific qualities of the invention, and its applicability to that general usage it aspires to. Distinguished by its simplicity, safety, economy, and the increase of light it gives to gas, the apparatus is described in the report as consisting simply of a cubic network of worsted wicks, the ends of which are immersed in naphtha, kept at a constant level, the network being in a cylinder of iron, or copper, between two sides perforated with small holes. A tube in like manner perforated admits the gas into the cylinder, and through the network of wicks already mentioned. In passing through the tubular foramina, the gas is mechanically cleansed from any tarry matter it may have borne thither with it, and thence traversing the worsted wicks, now saturated by their capillary power with the naphtha, it enriches itself by the vapour of that spirit, which absorbs from it its sulphurous element, thus purifying its quality while augmenting its intensity of light; and thus influenced passes into the exitory tube communicating with the service-pipe of the burners.

A saving of 40 per cent., that is, 5 per cent. more than the patentees lay claim to in their public statement, is recorded by the jury, with the remark that such estimate was arrived at after the system had been subjected to severe and several trials; and the evidence of the director of the Great Seminary of Avignon is cited to the fact, that "Since the use of the apparatus their gas flame is purer and less vacillating, and the quantity of gas passing through the carburettor has more lighting power than double the quantity of ordinary gas."

Baron NAFÉAN, treasurer of the Masonic Grand Lodge, on the part of the brethren, referring to the carburettor, writes—"We are happy to proclaim our entire satisfaction." The Literary Institution, too, accords its admiration and approval of the gas so purified, and particularly notices that the combustion is without smell or other inconvenience. Commercial houses write further in commendation, and the Editor of the *Courier du Gard* publishes his experience of the system in the printing and official departments in a declaration as to the economy, purity, and increase of light effected.

The prejudice so many entertain against the use of naphtha is, in this instance, so provided for that the most sceptical, with reference to the prudence of introducing it into domestic and commercial consumption, must, upon inspection of this simple carburetted apparatus, become convinced

that all fear and doubt on the subject should rationally be set aside. As to the chemical qualities of that used in the carburettor, the professors report that it boils at 167° to 170° Fahr., and at a temperature of 50° its specific gravity is .88, so that a gallon of the naphtha weighs 8.8 lbs., and the price charged as amply profitable to them by the inventors is 7s. per gallon, and they further declare one of the most prominent advantages of this carburetted medium to be its extremely purifying capabilities, for the gas passed through it would neither discolour the lead paper nor the solution of acetate of lead through which it was transmitted, and the table of consumption formed from observations instituted from the 11th to the 31st of last December indicates that for a constant volume of gas the consumption of naphtha is in inverse ratio to the velocity of the gas, so that it appears the larger the burner the less is the gas carburetted, and, consequently, the lower is the power of illumination; but, passing over for the time being the other statistical trials made, it is conclusive to state that with the smaller and appropriate burners a saving was effected in one establishment to the extent that in January, 1862, previous to carburation, the cubic feet of gas consumed amounted to 4061, whereas the carburetted, through the same burners, only reached the figure of 2190 ft., giving an economy in gas equal to 48 per cent., thus valuably confirming all the experiments which were with such severe scrutiny scientifically made. For the sake of gas consumers in this and every other country—in a word, for that of the public health—it is to be hoped this system will be, if possible, practically proved still more worthy of general adoption. We are informed Dr. LUTHEY has given an opinion favourable to it. In our own inspection of the apparatus we were happy to recognise a much-needed quality in the carburetted gas—the great diminution of heat in it, compared with the caloric diffused by the ordinary gas. This will be a great boon, particularly to private consumers. Looking at the invention in all its features and phases, it is valuable on every sanitary and economical consideration.

RAILWAYS IN MOUNTAINOUS DISTRICTS.

APPLICATION OF THE NEW FUNICULAR PRINCIPLE OF TRACTION TO THE INCLINED PLANE AT THE GIOVI, ON THE STATE RAILWAY FROM GENOA TO TURIN.

The experiments at Dusino show that the locomotor on the inclined plane at the Giovi, adopting the two planes, as proposed by M. Maus, could not exceed 3340 ft. per mile. The mean gradient is 1 in 36, and the curves are good; with the exception of some small portions they have a radius of upwards of a $\frac{1}{2}$ mile. Were it proposed to apply the new principle at the Giovi inclined planes there would be at disposition a force equal to 1200 horses, furnished by the water almost perennially flowing along the line, and which, in letting it out on lease to Mr. Nicolay, the Government reserved to itself the right of employing for the propulsion of trains. Two hydraulic machines, with columns of water, could be made, one at the summit, the other at the foot of the inclined plane, and two others at the half-way level of 492 feet, which M. Maus made for such an object. The upper hydraulic machine could be supplied by a conduit $1\frac{1}{2}$ mile in length, which would have to be made purposely above Busalla, in the valley of the Scrivia. The funicular apparatus would only be applied to one of the lines of rails destined for the luggage trains, while the other line would be left as it is for the passenger trains, to be drawn by ordinary locomotives. The daily goods traffic on these inclined planes already exceeds 1,000 tons, and is so rapidly increasing that it is begun to be felt necessary either to modify the line itself, in order to lay out a gentler gradient, or else to change the actual system of locomotion, in order to diminish the exorbitant expense. This want will become all the more imperative when the commerce of the port of Genoa shall have increased, through the completion of the Mont Cenis Tunnel, and the opening of the Suez Canal.

In order to establish a comparative table of the working expenses by the new principle, and that by locomotives as at present in use, let it be assumed the daily goods traffic to be 1500 tons, which it will very soon reach according to the present rate of increase. The first cost of applying the funicular principle at the inclined planes at the Giovi, six miles long (providing 20,000 ft. reserve capital), will be 69,000 ft., and the total annual working expenses (including interest on capital and sinking fund at 7 per cent.) 6840 ft. The working expenses of conveying 1500 tons of goods daily along the inclined planes by means of the ordinary locomotives, inclusive of wear and tear, has been estimated by Chev. Buva, C.E., as follows:—The number of wagons necessary for conveying 1500 tons of goods, at 7 tons per wagon, is 214. Supposing the wagons to weigh 4 tons each, the gross weight of 214 loaded wagons would be 2556 tons. Assuming the weight of locomotives to be half that of the train they propel, the total weight of the train with their locomotives would be 3834 tons daily. The power necessary for conveying 3834 tons for six miles, from Pontedecino to Busalla, with a vertical height of 918 ft. (the difference of level between the two stations), will be 3,743,170 tons. The expense of raising 1 ton 1 ft. high is 0.00475 pence; therefore, the cost will be 744. 1s. 8d. daily, or 26,670 ft. per annum. In this calculation the wear and tear of the wagons and the wages of the breakmen have been taken at 0.075 pence per mile per wagon, from which we get with the daily traffic of 214 goods wagons to and from an annual cost per mile of 216 ft. 13s., and for the 12 miles of journey to and from 2600 ft. The remainder, which is the expense of fuel and keeping the machinery in order, will thus be 24,070 ft. As by the new principle the locomotives so destructive to the rails and sleepers are done away with, it may be presumed that the expense would be approximately reduced to that which it is on an average on the whole line of railway from Genoa to Turin—290 ft. per mile, the load being the same. It has, however, been found that the wear and tear of the rails, sleepers, &c., on the inclined planes of the Giovi is at least three times as great as on the other parts of the line; so that dispensing with the locomotive there would be an economy of at least 3480 ft. Then, by adopting the new principle it would be possible to dispense with at least twelve or thirteen locomotives, representing a capital of 4600 ft., which at an annual interest of 6 per cent. is equal to 2760 ft.; so that the expense by the present system with locomotives is 29,718 ft., whilst the expense by the new principle would be 6840 ft., showing an annual saving by the latter method of 22,878 ft. Part of this saving would be paid to the Government as a compensation for their right over the water-course. Messrs. Nicolay would work the line thus made for the fifteen years of their lease, realising an annual dividend, which would amount to about 50 per cent. of the capital lodged in the undertaking. The whole apparatus could be put up in six months time, without in the slightest degree obstructing the traffic of the line. The advantage which the Government would obtain by the establishment of the new principle on the inclined planes at the Giovi would not be confined to the annual saving of 22,800 ft., which they would have at the expiration of the 15 years, during which the water-power has been leased out.

The serious difficulties which arise from the numerous lines of railway in mountainous regions which the Government works, or on which it has either guaranteed a certain fixed dividend or gave a considerable subvention, are such that unquestionably the success of the new principle will render it highly desirable, in an economic point of view, to apply it on several of the lines with very great advantage to the Treasury. By the adoption of this principle it would be possible to make a large number of railways in mountainous districts, where hitherto the uncertainty of obtaining any dividends has not permitted of their being thought of. It was in reference to this fact that the Commission of the Jury at the Florence Exhibition stated at the end of their report that "the new principle of traction appeared to be destined to introduce a revolution in the method of making railways as important as replace with great economic advantages." The funicular locomotor acquires a still further importance from the success obtained by the performing machines employed in the Mont Cenis tunnel, as it naturally becomes their complement in the resolution of the difficult question of the passage of lofty mountains, for although the perforators permit of lowering the culminating point of the line at least a thousand feet below the mountain pass, let it be borne in mind that still the tunnel is no less than 2600 feet above the sea level; to reach this elevation must be attended with great expense by the ordinary system of locomotives.

Everything enunciated in this paper has been demonstrated to evidence on a large scale in the experiments carried on at Dusino, near Villafraanca, close to Asti, on the inclined plane arranged expressly for the purpose at an expense of 7200 ft., of which two-thirds have been paid by the company interested in the experiment, provided by H.E.R. the Prince of Carignano, and the remainder been voted by the Italian Parliament. These experiments are being still carried on, and will be continued for another month, in order to enable everyone to form just conception of the practical importance of this

new principle of locomotion, on which reports will shortly be made by the Commission appointed by the Minister of Public Works, as well as by a corps of foreign engineers, to whom it sufficed having seen the model of the machinery at the International Exhibition, in order to take the warmest interest in the matter.

The first report of the Commission (consisting of Profs. J. Codazza, L. Magrini, and Colombo, C.E., reporter) appointed by the Royal Lombard Institute of Science, Literature, and Arts, at Milan, to examine Mr. Agudio's funicular locomotor, for working with the usual trains on very steep railway inclined planes, states that the system of traction for inclined planes on railways presented by Mr. Tommaso Agudio, C.E., M.I.P., at the present competition of the Institute, and on which the Commission are called upon to pronounce their opinion, has been already for some time placed before engineers. It obtained a prize at the Italian Exhibition in 1861, and another medal at the International Exhibition. The Royal Commission appointed to study this principle passed such a favourable opinion on it that the Italian Parliament voted a grant for carrying on the experiments on an extensive scale. These experiments, which are now being made at the inclined plane at Dusino, between Turin and Genoa, will prove the practical value of the funicular locomotor, which in theory has been universally approved of.

The favourable votes of two juries and of a commission of engineers have simplified the work of the Commission, and on the eve of decisive experiments, carried out with the utmost care, they would only have to recognise and confirm the accuracy of the principle, leaving the final judgment to be passed when the experiments are concluded. The Commissioners, in closing an elaborate report, remark that—1. With their present state of knowledge regarding the best methods of ascending very steep inclined planes by railways, two only are possible, and accepted as feasible—those by which the traction is effected by locomotives or by stationary engines. Our experience of the latter plan, at least by the present principle, has given very unsatisfactory results within the limits of ordinary gradients. 2. M. Agudio's new principle of traction by ropes, with stationary engines, overcomes the inconveniences of the old plan, especially those relating to the topographical disposition of the line of railway, for it permits of laying it out precisely in the same manner as for an ordinary locomotive railway. 3. Should it be deemed either advisable or necessary to lay out a line of railway having inclined planes, where it would be a matter of enormous expense to employ locomotives, M. Agudio's principle could be adopted with signal benefit to lessen the expenses of making and working the railway. For these reasons, and anticipating the pending decisive experiments on this subject, they propose to their honourable colleagues to award M. Agudio's invention the gold medal, provided the results of the experiment should be in accordance with the judgment they have given.

On July 31 the Commission was directed by the President of the Royal Lombard Institute of Science, Literature, and Arts, to go and examine the experiments being made on the inclined plane at Dusino, with M. Agudio's funicular locomotor. They now complete their duties by giving the results of the experiments which they witnessed. They are led to resume their conclusions thus:—

1.—The experiments made on August 2 and on the preceding days with M. Agudio's funicular locomotor, on the inclined plane at Dusino, prove, in an absolute manner, its applicability and practicability. They show not only the accuracy of the theory upon which M. Agudio has based his labours, but likewise the fitness of the means he has devised for turning it to practical account. The funicular locomotor works precisely as the inventor foresaw, and does not present any of those inconveniences which might have been feared, especially such as relate to the inequality of tension of the motor rope, the resistance of the pulleys supporting the rope, and the difficulty of managing the trains, so that we may pronounce that this principle is definitely launched into the field of practice, where it will be necessary to determine the questions of economy and applicability to the working of a line with great traffic.

2.—The present experiments having shown the practical suitability of M. Agudio's principle, we hope shortly to witness its economic advantages, anticipating the revolution which it is surely destined to produce in the working of great mountain lines. This economic problem cannot be defined *a priori*; and it could only be imperfectly solved by the present experiments, although all its numerous elements were taken into consideration. This task is reserved for the Royal Commission, for the want of instruments did not permit us to do more. We have already defined the merits of M. Agudio's principle: we may repeat that it enables us to make railways with the steepest inclines, above the limits fixed for locomotives, and obviates all the exigencies which the previous system of traction imposed in laying out the line, as regards the length and curvature of the inclined planes, while it preserves its superiority in regard to economy of working, which the traction system presented over the use of locomotives, by riding the train of the dead weight of the locomotive, and permitting the employment of water-power.

Our most serious apprehensions related to the conditions of working an inclined plane intercalated in a line on which locomotives are used. These doubts, founded on the results of the inclined planes at Liège, have not been removed by the experiments at Dusino, on account of the shortness of the distance, as they are not executed on a gradient inclining long. Judge of the characteristic excellence of the new principle over the former one; on the other hand, these experiments are not carried on in correspondence with trains arriving with locomotives, which would be necessary to prove the superiority of the means by which the inventor transfers the trains from one system of locomotion to the other. For this reason it would be very useful to apply this principle on the inclined plane of the Giovi, which fulfils every condition of curvature and gradient, and is situated on an important trunk line, where the traffic is very great, and where the water-course of M. Nicolay would supply a motive power more than sufficient for every purpose.

On the 1st of August the execution of such experiments as these, we hold to the conclusions we arrived at in our first report—that although M. Agudio's principle cannot compete with locomotives on gradients within the limits assigned to the latter, owing to their simplicity and rapidity of working; yet, on account of the extraordinary improvements he has introduced into the mode of traction by ropes, it may be eminently useful; for the expense of making the line will be very considerably reduced by forming gradients such as could not be economically worked with locomotives. These advantages will increase rapidly with the gradient; and the possibility of using water-power will in many cases extend the application of the principle even on inclined planes within the prescribed limits. In consequence of the foregoing considerations, although our object is not to pronounce upon the economic conditions of M. Agudio's principle, we believe that the present experiments are sufficient to confirm our preceding report, in consequence of which we propose to you, honourable colleagues, to annul the reservation we made in our first report, and to award to M. Agudio definitely the gold medal which was already deliberated upon in his favour.

CONCLUSIONS.—The detailed examination of the new principle of locomotion, and the opinions expressed by the juries of the Italian and International Exhibitions, and, still later, those by a Commission appointed by the Royal Institute of Sciences, at Milan, to pronounce on the experiments now being made at Dusino, near Turin, tends to show:—

- 1.—The new principle permits of employing steep inclines on railways, such as it would be quite impossible to accomplish by ordinary means, and that with perfect security in the descent, on account of the power of the brakes of the locomotor.
- 2.—The same curves may be adopted in laying out the line as in the ordinary railway, without causing any sensible additional resistance to the traction of the train, owing to the great diminution in the longitudinal tension of the rope, and the extreme facility of motion of the rollers, which support it on the whole length of the inclined plane.
- 3.—The length of inclined planes can be increased by this means to four miles, with great economy in the expense of making and working.
- 4.—Trains in motion can be stopped by a very simple mechanism, and, while it is possible to accumulate in the locomotor the force necessary for overcoming the inertia and gravity of the train, it is equally easy to set it in motion, even on the steepest incline, which is not always feasible with ordinary locomotives, from want of necessary friction.
- 5.—The action of the stationary engines placed at the extremities of the inclined plane can be regulated on the locomotor, since the duty performed by the engines depends upon whether the rope draws the train or not.
- 6.—Breakage of the motor cord is extremely unlikely to occur, because—A The rope may be easily made of a diameter greater than would be sufficient for performing the necessary effort, which would scarcely be possible on railways worked with ordinary traction, where the rope is already of a considerable weight, while by the new principle the passive resistance would be but slightly increased by a sensible increase in the diameter of the rope.—B The rigidity of ropes being nearly proportional to the squares of

* The inventor states that the method by which a train may be conveyed from the first inclined plane to the next, when there is a series of them, is easy. The locomotor is detached from the train, A, as soon as it reaches the summit of the incline plane, and awaits there the first train, B, which it is to convey back. An endless rope, placed along the horizontal plane, and to which the train, A, is attached, is set in motion by the simultaneous action of the same fixed motor which is employed for the traction on the inclined plane; being drawn by the rope, A, it leaves the first inclined plane, and passes on to a siding to be attached to the locomotor of the ascending one. While this operation is going on for propelling A from one inclined plane to another, a similar operation takes place with the descending train, B, which is travelling on a parallel siding.

their sections, their wear and tear in passing round large pulleys is far less than that which would be produced on the large ropes by the usual system. The great velocity of motion afforded by the use of Atwood's supporting rollers diminishes the sliding of the ropes of the latter. The arrangement adopted for transmitting the force from the motors to the pulleys by the friction produced by a constant pressure, regulated by a lever with a counterpoise, prevents the rope from ever having to bear a greater traction than is necessary, so that it is very unlikely to break. Even should it happen to break the safety of the train would be in no way endangered thereby, and its repair could be accomplished with all the more ease from its smallness.

7.—The longitudinal tension of the rope, in order to put the train in motion, is not the fourth of what would be required for direct traction, so that an iron rope weighing 3 lbs. 10 ozs. avoirdupois per yard suffices for drawing a train of 150 tons up an incline of 1 in 25, and upwards of three miles long; whereas, by the plan adopted on the inclined plane in Liège, a rope weighing 7 lbs. 7½ ozs. per yard is necessary for dragging a train of 75 tons only. If, therefore, the double velocity of the rope relative to the train, by the new principle, would cause it to wear out twice as fast, it would be compensated by the doubled weight of the train, which reduces the number of journeys to convey a given weight. Thus, without taking into consideration the diminished wear and tear of a rope of 3 lbs. 10 ozs. per yard, as compared with that of 7 lbs. 7½ ozs., for the reasons given, it is certain that the two ropes travelling through equal distances in a given time would have the same durability. Further, it must not be overlooked that the expense of repair and exchange of the smaller rope would be about half that required for one of double the weight, even though the rope should act in its descent similar to what it does at Liège.

8.—The new funicular system, based on the principle of double-action differential pulleys, would present 50 per cent. and upwards of useful force, if applied to the inclined plane of the Giovi, where the two locomotives together, as at present employed, only give 20 per cent. Steam, as a motor, could be in general replaced by water, which is almost always met with in the mountains, for 22 gallons of water per second at the top of the inclined plane would suffice for a very important locomotion, and the water could be conveyed through a conduit from the top of the inclined plane to supply the motor at the foot of the incline, its force being proportional to the length and gradient of the incline.

The Commission of the Jury at Florence were, therefore, correct when they summed up their report with these words:—“The Commission think, then, that they may conclude that the principle submitted to them for examination completely and successfully resolves the difficult problem of practical locomotion on steep railway gradients, both as regards facility and safety in working the line, as in the economy accompanying it.” In consequence of this report the Commission for the Italian Exhibition unanimously awarded a medal for this invention, which the Jury of the International Exhibition likewise recompensed with a medal a year later, after recognising its incontestable merits.

MANUFACTURE OF IRON FROM TITANACEOUS SAND.—In treating the iserine or titaniferous iron-sand, which occurs so abundantly near New Plymouth, in New Zealand, and on various parts of the coast of Italy, Mr. E. B. Wilson, of Parliament-street, proposes to proceed thus:—Instead of using any titaniferous or other material to agglutinate its particles, he charges the furnace with ordinary pig-iron, using as small a quantity as possible for this first operation, and when the hearth of the blast-furnace or cupola has become sufficiently filled with metal in its molten state, he taps the furnace or cupola in the ordinary way, and runs the said metal into pig moulds, or moulds forming slabs of any required thickness or pans, or ingot moulds, or any mould or form found most convenient, and while in the liquid state he mixes with it the titaniferous iron-sand in its natural state, and when such is sufficiently set and cold he breaks it up into convenient pieces for charging the said furnace or cupola in the ordinary way, and so he proceeds to make use of every third or fourth charge run off, or when required of molten metal, and mixing with it the titaniferous sand in its natural state, as shall keep the furnace constantly at work. The proportions he has found most convenient are one part of molten metal with two parts of the sand in its natural state; in this proportion every third charge run off would be sufficient to keep the furnace supplied; but he does not confine himself to these proportions. He carefully avoids mixing the iserine or titaniferous iron-sand previously to introducing the said iserine or titaniferous iron-sand into the blast-furnace or cupola with either bituminous coal, or clay, or lime, or mixtures of these, as such mixtures, although they may be of great agglutinating power, the particles of the said ore would nevertheless prove injurious to the quality of the alloy obtained therefrom when the said alloy is intended to be subsequently used for the manufacture of steel, and, therefore, he prefers to agglutinate the particles in its natural state with a portion in its molten state. The fuel he employs in the blast-furnace or cupola for the purpose of melting the iserine or titaniferous iron-sand may be either coal, coke, or charcoal fuel, but when the alloy of titanium and iron is intended to be subsequently used for the manufacture of steel he prefers to use charcoal fuel, as it requires an intense temperature in order to deoxidise and metallise the particles of titanic acid or oxide of titanium in contact with carbonaceous matter. He prefers to supply the blast-furnace or cupola with the titaniferous iron-sand in its natural state, but cold blast may be employed, where heated air cannot be conveniently obtained. The said blast of heated air, in order to be most effective, should possess a temperature of not less than 600° of Fahrenheit's scale. The blast-furnace or cupola being filled with ignited coal, coke, or charcoal fuel, he introduces at the filling place of the said furnace 4 cwt. of the titaniferous iron-sand or iserine herein before described; over this he places 2 cwt. of fuel, and over this a second charge of 4 cwt. of the said titaniferous iron-sand; again, over this he places 2 cwt. of fuel, and so on. He proceeds charging the furnace as the fuel burns away and the charge work down in the furnace, but he does not confine himself to the relative proportions of the titaniferous iron-sand and fuel employed for the burdening of the blast-furnace or cupola herein set down, for the proportions may be varied without departing from the nature of his invention. Fluxes may be added to the burden of the blast-furnace or cupola, such as blast-furnace clinders, clay, and lime, but such fluxes must not be mixed up with the titaniferous iron-sand previously to the introduction of the said iserine or titaniferous iron-sand into the blast-furnace or cupola. Manganese may be employed as a flux either mixed with it or added separately to the burden of the blast-furnace or cupola, but he does not claim the addition of these fluxes as part of his invention. When the hearth of the blast-furnace or cupola has become sufficiently filled with the metal reduced from the New Zealand iserine or titaniferous iron-sand introduced into the said furnace, with the coal, coke, or charcoal fuel, he taps the furnace or cupola in the ordinary manner, and runs the metal into pig-moulds of iron or sand.

AIR-SUPPLYING APPARATUS.—Some improvements in apparatus for supplying air for mixture with gases and other aeriform fluids have been invented by Mr. J. Gailey, of Chelsea. The apparatus consists of two chambers or receivers, similar to gas-holders—that is to say, they are chambers inverted and open at bottom, and dipping into outer casings containing water or other fluid, which inverted chambers have alternate up and down reciprocating motion imparted to them: the interior of such chambers have air inlet and outlet communications, the inlet being controlled by suitable valves to permit the ingress, but to prevent the egress of air, while the outlet of the blast-furnace is furnished with valves to permit the egress of air but to prevent the ingress; these outlet passages communicate with a reservoir to contain the supply of air furnished, from whence it may be drawn for the purposes required, a safety or pressure-valve may be applied to this reservoir to regulate or limit the pressure of air therein. He communicates motion to the reciprocating chambers by means of a spring-train, or it may be a weight, a slight pressure and a small quantity of air only being required for the purposes to which he applies the apparatus of this invention. In connection with the train of wheels, he uses what is known as the mangle-motion, which, although the train always moves continuously in the direction, a reciprocating rotary motion is communicated to a wheel by reason of the pinion communicating the motion from the train gearing with a segment of teeth alternately on the inside and then on the outside of the periphery of such segment, as is well understood. To the wheel so actuated he attaches a rope or chain, from the ends of which the inverted chambers are suspended, and by which the reciprocating rotary motion of the mangle-wheel imparts a slow up and down motion to the inverted chamber, and so forcing a supply of air. He employs this apparatus to supply air for mixture with gaseous or other aeriform fluids, which require the combination of air to render them combustible, which fluids are usually but slightly above the atmospheric pressure. The supply and combination of air and gaseous fluids may be readily regulated by suitable supply chambers, pipes, and stop-taps, or other regulating or measuring apparatus. Instead of transmitting the motion of the mangle-wheel by cords or chains, the motion thereof may act as, or be communicated to, a beam or lever, from the opposite ends of which the inverted forcing chambers may be suspended by suitable rods.

OBTAINING MOTIVE-POWER.—The Bishop of Kingston (R. Courtenay), Jamaica, has provisionally specified some improvements in obtaining motive-power, which consists in the producing of motion by changing (increasing or diminishing) the specific gravity of an elastic fluid, the change being effected by revolving weights. As the arrangement, he proposes that an even number of weights, which are similar in weight, should be attached to equal distances from the other to the circumference of a vertical wheel, not immediately but by being placed at the end of levers, of which the other extremities are joined to the circumference, so as to play freely, as on hinges. The play on the hinges, however, is restricted by means of springs, which keep the levers more or less nearly in the direction of radii from the centre of the wheel. If put in motion by any external force the wheel would revolve more or less uniformly, but with no more tendency to stop than if the weights had been immovably attached to the circumference, and the springs would be alternately expanded and contracted as the weights revolved, which would alternately expand and contract by the motion of the wheel, as it employs vessels containing air or other elastic fluid. The specific gravity of the fluid (say, atmospheric air) will thus be alternately increased and diminished by the weights, or by the removal of that action and its operation in an opposite direction. The condensation will be all on one side of the wheel, which, therefore, will exceed the other side in specific gravity, and as the apparatus when in use is immersed in a fluid (it may be air) this, the heavy side, will descend whilst the light side will rise, thus creating the motive-power he proposes to produce. The principle of this invention is manifestly similar to that involved in the invention of Mr. Boutet, described some time since in the *Mining Journal*, and as both are equally opposed to simple natural law, it is of importance that no time should be lost in making known any successful results practically obtained.

We learn that the Royal Mint has just commenced a heavy coinage of gold, and which will occupy all the resources of that establishment up to February, 1864.

THE SLATE TRADE OF CORNWALL.—None but those who have visited the slate quarries of Delabole, in the parish of St. Teath, about 2½ miles from Camelford, can form any idea of the magnitude of the trade carried on, and the number of hands employed. At the present time, the slate risen in this county is in great demand, from its superior quality and durability, it being considered by many as the best in England. Many thousands tons are sold annually, and a large export trade is being carried on, chiefly to Plymouth, Wales, London, and France. Most of the slate from Delabole is shipped at Port Isaac and Port Gaverne, small ports on the north coast, in the parishes of Endellion; and, coals, generally speaking, the return freight. The stones raised at the present time are remarkably fine, probably the largest ever known, being of that dark blue colour which is so much sought after. A more picturesque sight is hardly to be met with in England than, on a fine day, to visit the hamlet of Pengelly, and go on to the Delabole Slate Quarry, close by. It is an open quarry, many hundred yards long, and 200 ft. in depth; and nearly a thousand hands are constantly employed. A visitor may easily descend to the bottom of the quarry by means of the tram, or footway; but the view from the point where the hoisting machinery is placed—on the brink of a precipice nearly 300 ft. deep—is one to be ever remembered. This valuable property was for many years in the Trevanion family, but Mr. Allen, of the Iweridge Paper Mills, and other gentlemen, are now the managers and workers; they have erected very powerful machinery, all the slate being now hoisted by steam power. There are other slate quarries near Tintagel, and on other parts of the north coast, but the quality of the Delabole is superior to all others.—*West Briton.*

THE BEARIZ TIN STREAMING COMPANY (LIMITED).

The following report, in the form of a circular by the secretary, has just been issued by the directors to the proprietary of this company:—

As directed by the directors, I have the pleasure to submit to you some details respecting the present state of matters at the mines of this company, and especially some information which the directors have recently received from Captain John Bray, the manager, as regards results which he thinks may be realised, of a much more specific and positive character than he had previously been able to impart to them. The board trusts that what I am thus to communicate will afford to the proprietary, as it has done to the directors, great satisfaction and encouragement. It has been the object, as you have been already made aware, to concentrate the first operations of the company to the group of fourteen pertenencias, called San Miguel, where a very large deposit of kaolin exists, and which could be worked with great facility and advantage. At the pertenencia of San Miguel proper, in this group, adits have been driven—tram and railways have been laid down—water-wheel and stamps and dressing machinery erected—a vast reservoir made—and a very large quantity of kaolin uncovered and otherwise reached by levels. From March to September inclusive little or nothing could be done in the way of stamping, owing to a want of water, which will not again be experienced. The scarcity was caused principally by the unprecedented drought which has prevailed in Spain, as elsewhere, during this summer. In seasons to come, however, the operations of the company will be more or less independent of the weather, owing to the supply which will be forthcoming from a second and exclusive adit, which will be soon completed. At present, however, the existing sources of water are giving an abundant supply, and twenty-four heads of stamps are in full operation.

Captain Bray has sent to the directors a carefully prepared estimate of the annual labour cost, produce, and profit of working these twenty-four heads of stamps, which shows that the labour cost will be 23677.2s., the value of the produce 40501.0s., and the profit 16831.8s., as follows:—

2800 tons to be stamped by 24 heads of stamps per month for six months of the year £16,800 tons of kaolin.
1400 tons by 12 ditto for the other six months ditto, .. 8,400 "

Total number of tons to be stamped in 12 months, 25,200 tons of kaolin.
25,200 tons of kaolin giving net produce of 6 lbs. of tin ore per ton, £4050 0 0
151,200 lbs., or 67 tons 10 cwt. tin ore, at £60 per ton,

Salaries of the manager and the accountant, and wages of English staff of workmen £1913 12 0
General overseer 3,600 rs. .. £37 10 0

12 men breaking kaolin at 6 rs. per diem, for 12 working months of 24 days each 20,736 .. 216 0 0
8 men tramming ditto at ditto, for ditto 13,824 .. 144 0 0
10 ordinary labourers at 5 rs. per ditto 14,400 .. 160 0 0

12 men driving ends and sinking shafts not on kaolin, or non-productive labour, at 150 rs. p. month each 21,600 .. 225 0 0
2 native carpenters at 7 rs. per diem for 12 working months, 24 days each 4,032 .. 42 0 0
2 native sawyers at ditto, for ditto 4,032 .. 42 0 0
1 smith's assistant, at 6 rs. per ditto for ditto 1,728 .. 18 0 0

30 women and boys on dressing floors, at 3½ rs. per ditto, for ditto 21,600 .. 225 0 0
3 stamp tenders at 6 rs. per ditto for ditto 5,184 .. 54 0 0

..... =1183 10 0=367 2 0

[96 rs. equal to 12.] Estimated annual profit* £1682 18 0

In this estimate the expenditure includes the whole salaries and wages of the English staff of the company; but this, of course, will have to be apportioned among the several pertenencias worked. The iserine, or kaolin, uncovered and reached by levels, and, therefore, ready to be conveyed to the stamps in San Miguel proper, at July 31st, Capt. Bray reports to be sufficient to keep the 24 heads of stamps erected there in full work for several years.

This estimate is based on the supposition that the 24 heads of stamps will be in operation during half of the year, and only half that number of stamps during the other six months, an assumption less favourable to the company than Capt. Bray expects will be realised, especially as arrangements have been made in virtue of which an additional supply of water will be obtained by means of the second level that is being constructed to this group from a stream at a distance of about two miles from it. Capt. Bray anticipated when he wrote the board on July 14th last that he would be able to complete his additional adit in a month from the time when he might be in a position to begin to cut it, at a cost of about 5000. In addition to these extensive works at San Miguel proper, Capt. Bray has made preparation for the erection of stamps, and the early commencement of stamping the kaolin existing in the pertenencias of San Guillermo and La Union (two others of the San Miguel group), at which three several localities the kaolin existing in all the fourteen pertenencias forming the group may be conveniently and satisfactorily worked. He has also made similar preparation for the erection of stamps at the groups San Vicente, San Patricio, and San Adolfo. He is also making preparation at the San Francisco group, where the preliminary work required consists of driving rather a long adit. Capt. Bray reports that he has proved the kaolin in this group to be richer in ore than in any other group. Besides the above groups, as you are also aware, there are four groups of pertenencias, in which the tin ore exists in quartz as the matrix of the lode. In these groups Capt. Bray reports that there are many promising lodes, and from the backs of which considerable quantities of ore had been raised by the former proprietor, but up to the present time operations of a very slight nature only have been executed upon them by the company, as it was not considered necessary or desirable to do more while good prospects of profitable results presented themselves by developing the kaolin groups, which are so much more easily worked. Captain Bray reports that stamps may be erected as follows:—At San Guillermo (San Miguel group), one set, 24 heads; at La Union (ditto), one set, 6 heads; at San Vicente and San Patricio groups, one set, 24 heads; at San Adolfo group, one set, 12 heads; at San Francisco group, one set, 12 heads. And he states that, with the exception of the San Francisco group, the whole may be erected within six months, and both as respects a supply of kaolin and water, will then be in full operation. As regards San Francisco, he states that the adit required being long, it will take considerably more than six months to drive it into the bed of kaolin. Capt. Bray has also furnished the directors with estimates showing the annual result of working the stamps proposed at San Guillermo, La Union, San Vicente, San Patricio, and San Adolfo respectively, as follows:—

	Tons cwt. qrs.	Total labour cost.	Value produce.
San Guillermo (of San Miguel group)	67 12 0	£1929 12 0	£4050 0 0
La Union (ditto)	16 17 2	474 15 0	1012 10 0
San Vicente and San Patricio groups	67 10 0	1694 0 0	4050 0 0
San Adolfo group	33 15 0	1075 11 10	3025 0 0

Tons of ore 185 12 2 £5173 18 10 £1137 10 0

Excess of produce over labour cost £5963 11 2

Estimated value of ore to be purchased from venturers, 6 tons, at 50l. per ton £300 0 0

Less—purchase price, at 1 real per lb. Galician, 10,599 rs. at 96 rs. per lb. 110 8 1= 189 11 11

Showing £5153 3 1

As the net annual profit of working these four sets of stamps; this sum of 5153.3s. 1d., added to the sum of 1682.18s., mentioned above as the net profit on the works of San Miguel proper, gives the total sum of 7835.1s. 1d., as the net profit in the working of all the five sets of stamps taken together, subject only to the yearly rent of the mines and the expenses in London. Throughout the calculations, as already stated, Captain Bray has assumed, as regards the working of the stamps, that the whole number of heads will be at work during half the year, and only half the number during the summer six months—this he considers a less favourable view of matters than he expects will be realised; but in this respect, as well as with reference to the quantity of kaolin raised, the percentage of the tin ore, the percentage of ore it will yield, and the price that will be obtained for the ore in England, he states that he has judged it desirable to make his estimate moderate, and such as will certainly be verified by results. Captain Bray has not yet made an estimate of the results of working the proposed twelve heads of stamps at the San Francisco group, for the reason stated, that it will be a considerable time before the adit will be driven into the bed of kaolin existing in it, but his report as to the degree of richness of the kaolin, and the ready means of securing an ample supply of water to this group is very satisfactory—neither has he made an estimate of results to be derived from working the quartz groups. In a second communication, under date Sept. 21, he confirms his estimates in the following emphatic terms, viz.:—“In reference to the estimates you will have observed that the different calculations applicable to the several groups are worked out on the same basis both as regards cost and produce. In each of the groups there will doubtless be some special variation affecting in a slight degree individual calculations based upon one general rule equally applied to all, but I confidently believe that any variation will be found in favour of the company, as I have in all cases carried the computation of cost to the furthest probable extent, and calculated the value of tin ore at the lowest admissible price.”

The directors are not yet in a position to state what outlay will be necessary to establish the intended works and erect stamps, &c., at San Guillermo, La Union, and San Patricio and San Adolfo, and to bring them into full operation; but they are at present in communication with Capt. Bray upon that subject, and as soon as they can acquire more precise information upon it, it is their intention to communicate with the proprietary again. In the meantime, however, it may be observed that the directors, having in view the cost of the work completed and in operation at San Miguel, and that there are favourable circumstances in the case of the other pertenencias or groups, have every reason to believe that the amount of outlay applicable to each of them will not be large.

I am further desired by the directors to inform you that within the last few months Senor Merelles, prompted by the great interest which he takes in the property of the company, has presented and legally transferred to him in perpetuity a mineral property (which under peculiar circumstances had come into his hands) situate at Corpiño, in Galicia, about 20 miles from Beariz, and which promises to be of great value. Capt. Bray thus describes these mines:—“They compose a group of eight pertenencias, lying on and about a hill of medium altitude, formed of decomposed granite, or what is known as commonly denominated granow, a formation eminently congenial to tin-bearing lodes. There are at least eight or ten distinct lodes, all running close upon N.E. and S.W. parallel with the hill, and dipping S.W. at the incline of about 1 ft. in the fathom. These lodes are all productive in a greater or less degree, and from the majority of them, which have been worked to some considerable extent, large quantities of tin have been taken; but the chief sources of their mineral wealth, taking present visible indications as the basis of calculation for the direction of future operations, are to be sought in three principal lodes, which have hitherto yielded by far the greatest proportion in the entire produce of the mines: two of these last mentioned lodes vary from 4 ft. to between 8 and 10 ft. in width; the third, or middle, lode consists of a course of clay bearing close resemblance to that at San Miguel, San Francisco, &c. (in the Beariz Mines), and with a varying width of from 6 to 10 ft. Tin is thickly disseminated in this kaolin lode, but mixed with a strong proportion of wolfram. Between and beyond these three principal lodes are several smaller ones, all of which have yielded considerable quantities of tin. By the credit of all mining operations, viz.:—the desultory and unconcentrated labours of venturers, upwards of 1200 quintals (60 tons) of metal has been raised and sold within the last few years, and the highest price paid for the ore has been 6 quetzales per lb. The produce of this result is worthy of notice, considering the means by which it has been arrived at. Hitherto, nothing of the nature of real mining operations has been essayed on the ground; all practical exploration being limited to the unsystematic labours of the venturers, who, wanting the

requisite knowledge, are compelled to desist at obstacles which would be but temporary impediments to the practical miner. Openings have been made at the surface, and the tin followed down to a poor floor or to water; there the works have been stopped, refilled with rubbish, and abandoned for fresh places, opened, prosecuted, refilled, and abandoned in the same manner. By such inadequate means the works have been carried on at a distance of hundreds of fathoms, and the greatest depth ever attained is, from what I could learn on the spot, between 5 and 10 fms. from the surface, for although the lodes are generally large and the ground easy for working, they are interested by the several veins of decomposed granite of a clayey nature, which retaining the water for want of systematic drainage put a stop to sinking. Although the lodes are of considerable magnitude the tin is not universally disseminated throughout the courses, running in veins or leaders of a variable width of from 1 to 6 in. These leaders are almost pure, and would require but little dressing, and the ground is of a nature to be worked in such a manner as to bring out the tin almost clean enough for the furnace—i.e., for the process of smelting, as at present in use at the works. Water is abundant close to the mines, and sufficient for all purposes may be procured. Wood is plentiful in the immediate neighbourhood, and the prices moderate. There is a small furnace for smelting erected on the works. While refraining from pronouncing the visible signs of mineral wealth as infallible indications of certain deductible and calculable results, I consider these mines well worthy of trial—that is to say, of trial to such an extent as shall give thorough and conclusive proof as to whether the deeper ground corresponds with the very favourable indications visible at the surface, and continuing to the lowest point reached by past and present operations. Were the mines situate in one of the many tin districts where the nature of the ground and the general course of the tin-bearing lodes are well known to me, I should not hesitate to pronounce these visible indications as certain evidences of a continued and increasing source of mineral wealth, but, on the other hand, as there are also many districts where tin lodes yielding largely at surface become attenuated and impoverished in deepening, and as the ground, in the absence of certain and evident proof to the contrary, may possibly be of the same illusory nature, I cannot hold out expectations of certain and assured results beyond what past experience will justify me in assuming. The ground must be proved to some depth to place beyond all doubt the fact of the existence of a continuity in depth of the lodes; still the indications are of such a highly favourable nature that good results may be reasonably hoped for. I would propose commencing operations on the smallest scale compatible with real effectiveness—namely, by driving in an adit at a medium depth on one of the principal lodes, and, when sufficiently in the hill, to cross-cut to prove the other lodes. This might be done at a cost, and if the lode continues in depth of the same extent and quality as it shows at surface, the tin taken out in the operation would, I am certain, cover the expense of driving. At the same time, as mentioned above, other current incidental expenses would be lessened, if not covered, by the venturers. The ground is very easy for working, requires but slight timbering, and that solely in isolated places, and the probable cost of driving, timbering included, would not exceed 30s. per fm.—i.e., basing the calculation upon present evidences. On the completion of the preliminary or proving operations, a series of levels might be driven in on the course of the lodes to a depth of upwards of 100 fms. No machinery would be required beyond small tools. Railways would, of course, be necessary, and these would constitute the heaviest item of expenditure in the preliminary outlay for the development of the works. In conclusion, while confidently recommending these mines as worthy of an effective trial, firmly believing, as I do, that the fair probabilities of remunerative results justify the expenditure of sufficient capital to obtain thorough and conclusive proof as to the existence of a continuity in the lodes, I repeat that such surface indications must not be regarded as invariably and infallible evidences of continuity; although in all my past experience I have never known indications that seemed more full of promise than these, the district is entirely new, and, therefore, these evidences which in known districts would be conclusive may possibly be here but purely superficial—rich in quantity but limited in depth, as I consider that every probable and possible disadvantage should be thoroughly investigated, and clearly manifested before any risk is undertaken, while I am convinced that the visible evidences justify the enterprise, I cannot withhold the one possibility of failure. The possession of these mines, if productive, would give the company the monopoly of the tin market in the North of Spain, as with the exception of the mines at Riba d'Abe, of which the ore produced is shipped for smelting in England, or two poor tracks of tin-bearing clay worked and in turn abandoned by venturers, there is no other enterprising or similar mine in the district of Galicia. I estimate the extreme cost of obtaining an effective and conclusive proof, taking into consideration all probable disadvantages and throwing out of the calculation all returns in actual working, at 2000l. If the tin continues in depth not half that amount will be required.”

Since the company acquired this property they have employed 10 or 12 men in beginning to carry out the limited operations recommended by Capt. Bray, and the results so far have been extremely satisfactory. The company have also allowed the venturers to continue their operations in certain parts of the property, on condition that the ore raised by them be sold to the property of the company at a certain fixed price. Up to the end of last month the company's connection with the property has resulted in an actual gain—the profit on the ore obtained exceeding the entire outlay. The directors were unwilling to enter into any large operations of these mines until the Beariz Mines were more fully developed. At the same time, however, it is a fact that the amount of tin ore brought in by venturers, and obtained in preliminary drivings up to the end of September, left a net profit to the company of upwards of 1000l., after deducting expenditure of every kind at Corpiño. Henceforth the production of ore from venturers alone will, in all probability, not be less than 2 tons a month, and the amount of tin ore entirely subsidiary to all operations which the company may themselves commence will be as follows, viz.:—The company to receive out of the net profits in the first instance 5 per cent. on the capital employed by them in working the property, the former owners of the property then to get 5 per cent. of the remaining balance of such net profit, the other 95 per cent. thereof to belong to the company. Senor Merelles, therefore, has received no direct personal advantage for transferring the property to the company, while the royalty payable to the former owners may be said to be almost nominal. A short period and a small further outlay will suffice to determine more positively the character and value of this property, and should present indications be fully confirmed it is anticipated that such results may be obtained by working it as will be very beneficial to the shareholders of this company.

GOLD IN CANADA.—In consequence of the alleged discoveries of gold on the Chaudière, the Hon. Wm. Macdougall, the Commissioner of Crown Lands, has ordered the clerk of Crown domains to officially report upon the subject, the instructions to Mr. Judah being to “visit the gold mining districts and report to me the actual state of affairs. Your attention will be directed especially to reported indications of gold, and the position, nature, and extent of the mining operations now going on, whether in the seignories or on the lands of the Crown.” Mr. Judah, in concluding an elaborate report (the chief details of which are embodied in our article in the *Journal* of Sept. 26) writes:—

“A vein of quartz crosses the Chaudière, at the Devil's Rapids, in St. François, a little below the Gilbert, and is seen on the hill on the main road. I also saw quartz cropping out in several places. Some of this quartz, I am told, has been tested, and contains gold. No quartz mining operations have yet been undertaken anywhere, sufficient indications not having presented themselves, and the mining has, so far, been confined exclusively to alluvial diggings; but explorations, of whom I met more than one, are now out in numbers, and the existence or not of gold in the quartz state, *in situ*, in sufficient quantities to pay for working, will now, no doubt, soon be established. All the mining operations have also so far taken place in the seignories, nothing having been done, as far as I could learn, on the Crown lands. The country through which I travelled along the banks of the Chaudière consists of rich alluvial flats, gradually rising from the river to a distance in some places of as much as 30 or 40 arpents, with hills and plateau of cultivated land in rear, well and continuously settled as far as I went to the forks of the Saguenay. The lower range of the Chaudière range of the Saguenay, where the mining on the Gilbert is going on, is the third from the river, and is, in principle, the first two ranges are all cleared and cultivated. I cannot conclude this report without bearing testimony to the quiet and good order existing at the Gilbert Mine. The miners consist principally of French Canadian habitants from the adjoining parishes, with a few persons from Quebec and elsewhere, and on neither of my visits did I hear a word spoken in anger.”

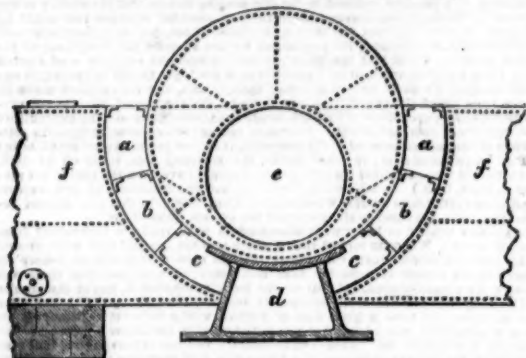
GOLD IN WALES.—“A Tourist,” writing on the Depreciation of Gold, says:—“During the last twelve months it has not unfrequently happened that the question of ‘Gold in Wales’ has been discussed over the dinner table, and the conflicting opinions that have been expressed have certainly seemed most puzzling. Here and there someone has been found bold enough to assert that gold-producing mines were actually being worked at a high profit in Cambria; but for the most part the whole affair has been portrayed in a most absurd manner, while a few have been heard to say that it was a well-known fact that auriferous ore existed, yet this circumstance was of no practical value, because the expense of obtaining the small quantity of precious metal it contained was so great as to render it useless to think of working it. I was, therefore, glad of the opportunity afforded me of judging for myself, and I can only say that for the future, if ever the subject is again discussed in my presence, I shall be able to assert from the evidence of my own senses—1. That gold abounds in Wales; 2. That with means already at their disposal, mine proprietors have produced considerable quantities of the precious metal; and 3. That when the appliances of advancing science shall have simplified and otherwise improved the *modus operandi* of mining, it will be no longer the result of a miracle. The mine to which I would make earliest reference (for I saw three) was, I was told, originally a copper mine, and is still called the Vigna and Clogau Copper Company. It is situated about five miles from Dolgelly, and in the direct road from that place to Barmouth. An ordinary traveller would pass by without observing the little road that leads up to the mine. A short distance up this road are the works. They seemed to consist of a few rudely-constructed workshops or offices, a large enclosed shed, within which the sound of machinery was heard, and an enormous water-wheel; to the right, a small building, very roughly constructed, extending from these works to a hill close by; heaps here and there of earth and quartz and material of various kinds; a few, very few, workmen, and the Vigna and Clogau Works, as a casual observer would notice them, are described. The gentleman through whose kindness I was permitted to explore this interesting place requested that I might be allowed to see some of the ore which the mine has produced, and was still producing. A piece of quartz was handed to me for my inspection, studded all over with gold; and one of the practical people there informed me that this piece, which weighed about 7 lbs., contained at the least 12 ozs. of gold; that is, I believe, a quantity that would realise at the Bank of England about 400l. This, undoubtedly, was an exceptionally valuable piece of quartz, but it was taken from a rich shoot of auriferous matter, and such shoots are frequently found in the mine. On enquiry I heard that the richest of the ore worked had yielded as much as 788 ozs. of gold per ton, and that a quantity of 17 tons 11 cwt. had yielded 6182 ozs. 4 dwts., or 353 ozs. 4 dwts. per ton, while even of the poorest ore 892 tons produced 966 ozs. of gold, or 1¼ oz. per ton, a quantity, I believe, far beyond what is necessary to yield lucrative returns; indeed, I have been told that in some continental mines—in Hungary, for example—material containing only the quarter of an ounce to the ton is worked with profitable results. This same precious material exists in abundance in the neighbourhood of the Vigna and Clogau Mines. The West Clogau Mining Company very near, and the works of which I had also the advantage of seeing, is commencing operations. But the most striking development of auriferous quartz in the neighbourhood appears on a property known as Berthwyd, or Cefn Coch, about as far from Dolgelly as the Vigna and Clogau. Here an auriferous quartz lode appears on the surface, in some places many feet in width, and upon which repeated experiments with the British amalgamating machine have been made. This belongs, it appears, to the West Clogau Gold Mining Company. The experiments made are asserted to have yielded from 10 to 100 ozs. of gold to the ton, and I was very much in looking forward to hear an independent opinion of its value from Mr. Warrington Smyth, the mining engineer of the Woods and Forests.”

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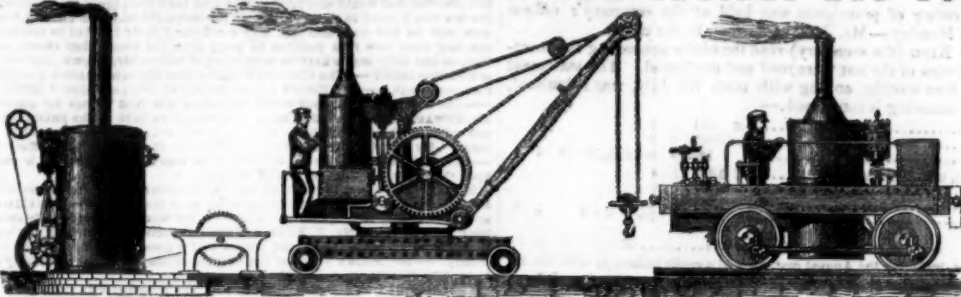
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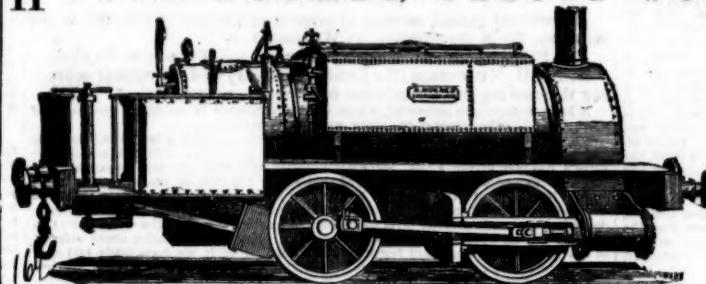
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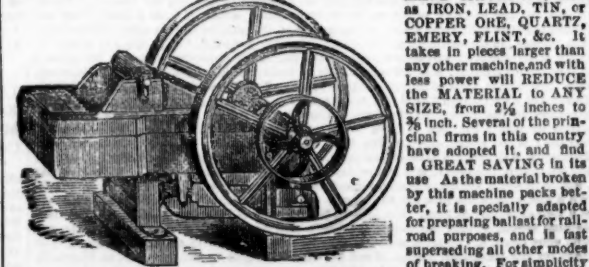
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